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WHAT IS EQUITY? WAYS OF SEEING

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Prospective teachers must be prepared for their role in providing equitable access for learning high quality mathematics. Therefore, it is imperative that mathematics teacher educators provide opportunities to develop an equity-centered orientation in teacher preparation courses. In this study, we begin to address this issue by identifying what prospective teachers attend to in a classroom vignette of an African American male student who is above grade level in mathematics and exhibits disruptive behavior during instruction. The results of the study indicate that while participants are beginning to attend to cultural influences, most responses are focused on classroom management strategies.

Keywords: Equity and Diversity, Teacher Education-Preservice

Introduction and Background

The National Council of Teachers of Mathematics (NCTM) asserts that in order to teach in an equitable manner, teachers and schools must maintain “high expectations and strong support for all students” (NCTM, 2000, p. 11), meaning mathematics teachers must provide opportunities for students to learn challenging mathematics regardless of their students’ “personal characteristics, backgrounds, or physical challenges” (p. 12). For the past two decades, mathematics educators conceptualized what it means to teach mathematics for equity (Gutiérrez, 2002; Gutstein, 2003; Hart, 2003; Matthews, 2005); yet only in recent years have mathematics teacher educators documented efforts to prepare prospective teachers (PTs) to teach mathematics while considering matters of equity (Bartell, 2010; Freitas, 2008; Wager, 2014). Unfortunately, many PTs and practicing teachers do not know how to make these necessary connections, especially with students who are different from their own culture and background (Futrell, Gomez, & Bedden, 2003; Turner, Drake, Roth McDuffie, Aguirre, Gau Bartell, & Foote, 2012). Therefore, within the current educational system, students from non-dominant backgrounds are often denied equitable opportunities to learn (Wager, 2014).

To further complicate the issue, many mathematics teachers dismiss issues of equity as relevant factors in the mathematics classroom because they view mathematics as a universal, culture-free subject (Rousseau & Tate, 2003). However, there is a growing body of mathematics education researchers who understand that mathematics and mathematical knowledge are neither universal nor culturally neutral, but are situated in a sociocultural framework (Ukpokodu, 2011). Moreover, Gay (2000) argues that if we “decontextualiz[e] teaching and learning from the ethnicities and cultures of students [it] minimizes the chances that their achievement potential will ever be fully realized” (p. 23). Reducing the opportunity gap in mathematics education is possible by transitioning to an equity-centered paradigm. With this goal in mind researchers, practitioners, and teacher educators in the mathematics education community must learn how to “value the cultural and lived experiences of all children...[and emphasize] the belief that all children possess strong intellectual capacity and bring a wealth of informal, out-of-school knowledge to the teaching and learning process”

(Lemons-Smith, 2008, p. 913). It is imperative that mathematics teacher educators begin this process by encouraging prospective and practicing teachers to critically examine their current beliefs while explicitly addressing the elements of teaching mathematics through an equitable lens. Attending to these practices in teacher preparation programs can help all teachers observe the actions that occur in the classroom, and determine effective strategies that will enhance all students' access to high quality mathematics instruction.

The extant literature in mathematics education provides an initial glance into equitable mathematics pedagogy, yet there is a need to better prepare PTs for their role in creating opportunities that provide equitable access for learning high quality mathematics. It is imperative PTs are given the opportunity to develop an equity-centered orientation toward mathematics teaching and learning to effectively instruct *all* students. In order to accomplish this goal, we must first recognize what PTs attend to as they direct their attention to various classroom events and how they relate the events to broader principles of teaching and learning, including cultural contexts that contribute to students' learning. In this study, we begin to address Wager's (2012) call and Hand's (2012) recommendation to assess how equity issues are perceived in classroom episodes by reporting what PTs notice about students' mathematical thinking and its relation to culture, home, and community.

Theoretical Framing for the Study

Equity may be viewed as a process or as a product (Crenshaw, 1988; Gutiérrez, 2002; Martin, 2003; Rousseau & Tate, 2003). Seeing equity as a process means treating all students equally, without regard to race, ethnicity, or economic background. On the other hand, seeing equity as a product means differentiating instruction based upon students' needs in order to promote equal learning outcomes. We adopt the view of equity as a product, and define teaching mathematics for equitable outcomes as approaches that are respectful of students' ethnic, racial, and economic background and promote equal learning outcomes.

Classroom episodes are complex; therefore, it is inevitable that individuals choose, consciously or subconsciously, what they attend to and then use these events to make instructional decisions. Before defining an approach that develops PTs' orientations toward teaching mathematics through an equity lens, we must first attend to how PTs perceive classroom situations and identify what they notice—or attend to—during the teaching and learning process. This process is referred to as the discipline of noticing. The ability to notice noteworthy classroom interactions or events among the plethora that occur in a complex classroom environment is a key component of teaching expertise (van Es & Sherin, 2006).

van Es and Sherin (2010) emphasize the key in the process of noticing is identifying what is significant, and then reasoning about the situation to effectively contribute to mathematics learning. Furthermore, Wager (2006) argues that mathematics teachers must not only attend to students' achievement, but also explore access, identity, and culture in order to provide students with equitable opportunities. Turner et. al. (2012) expand upon this sentiment in the context of noticing as they emphasize noticing critical elements within a classroom environment includes not only analyses of mathematical thinking, but also considers the impact of cultural knowledge as a foundation of students' mathematical knowledge base. The process of noticing generally involves three components: (a) identifying noteworthy instances within a classroom situation, (b) relating classroom interactions or events to principles of teaching and learning, and (c) using the cultural context to interpret the events and make instructional decisions. In this study, we incorporate a noticing lens to explore what PTs attend to as they reflect on a teaching vignette and how the events they notice correspond to equitable practice.

Method

In this paper, we describe an activity used in our elementary mathematics methods course that was designed to encourage PTs to face existing (and often hidden) biases in order to alter unproductive beliefs and consequently broaden their *ways of seeing*. We view this as an essential activity to help PTs: (a) develop an awareness of equity, (b) define what equity means in classroom instruction, and (c) implement equity practices within the mathematics classroom. Participants in the study were PTs from three different universities in the U.S. who were within a year of their student teaching experience. The demographics of the PTs reflected demographic patterns of elementary education majors at our universities and included 91.4% white females, 4.3% white males, 1.4% Asian female, and 2.9% African American females. A less diverse population of PTs is facing an ever increasingly diverse population of students in our public school systems.

To access the PTs' thoughts and ideas on issues related to equity in the mathematics classroom, we used classroom vignettes, each representing a different scenario that potentially challenges learners' equitable access to high quality mathematics. The five authentic topics included one of the following teachers: (a) one who exhibits gender bias for class participation, (b) one with preconceived biases that cause him to withdraw from students who are from different backgrounds than himself, (c) an instructor who does not take time to develop relationships with her racially diverse students, (d) one who recommends a new English Learner with limited English proficiency for special education services without adequately assessing the child's content knowledge, and (e) a teacher who is frustrated with a student who is above grade level in mathematics and exhibits disruptive classroom behavior.

To help ensure all PTs fully participated in the discussion of the equity cases, each PT independently read and responded to corresponding reflection questions for each case (Data Source 1 [DS 1]). Using a modified version of "jigsaw," a cooperative learning structure, the PTs were divided into five groups, where each group was randomly assigned a specific case and asked to discuss their responses (DS 2), which were audio-recorded and transcribed. The PTs recorded their thoughts to the guiding questions that accompanied their case on chart paper (DS 3), and an expert was selected from each small group to share their results with other members in the class. Everyone from each group, except the expert, rotated from case to case and listened to the "expert" report the group's analysis of the situation before the PTs shared their individual thoughts pertaining to the events in the vignette. At the conclusion of the discussion, the PTs recorded their thoughts and ideas on post-it notes that were placed on the chart paper (DS 4). Once the PTs finished rotating to each of the five groups, they returned to their original group where the expert shared what he/she learned from the discussions with the other groups. Finally, the PTs shared their thoughts and ideas on each case within a large group discussion.

For the purpose of this paper, we focus our results on one case, *Eric*, in particular because of the dichotomy the PTs perceived between Eric's mathematical knowledge and his exhibited behavior during a mathematics lesson. See figure 1 for the stated case and corresponding reflection questions.

Case: Eric

Eric, an African American third grader, is a good-looking nine-year old boy who was retained in first grade. He is below grade level in reading and language, but above grade level in mathematics. He has been removed from his home because of abuse and is being raised by a caring grandmother. During mathematics lessons, Eric harasses the other children. He closes their books while they are working, knocks their books and pencils off their desks, writes on their papers, and crumples up their work. He does his best to disrupt the lessons by making gestures and deliberately making noises. Ms. Maben, his teacher, is frustrated.

Reflection Questions:

1. If you were the teacher in this situation, how would you respond?
2. What are the implications for elementary teachers?
3. Additional comments or thoughts?

Figure 1: The case of Eric and corresponding reflection questions.

Data Collection and Data Analysis

The first part of the classroom assignment with Eric's case served as an opportunity to gain insight into what individual PTs highlighted as significant. When students read the vignette and addressed the reflection prompts we could ascertain the three elements in the noticing process. First we identified what the PTs found noteworthy in the classroom situation with Eric. Secondly, we determined how the PTs related classroom interactions or events to principles of teaching and learning from their responses to the first, and particularly second, question. Finally, we thoroughly examined their responses for evidence of using the cultural context in the given situation to interpret the events and make instructional decisions.

As PTs continued to work through the jigsaw activity discussing the scenario in small groups and with a follow-up large group discussion, the mathematics teacher educator in each of the three methods courses guided the conversations to further engage PTs in the second and third characteristics of noticing: (a) using contextual information to reason about witnessed events, and (b) making sense of the events through a contextual lens and using the knowledge to inform instructional decisions.

The data generated from the individual reflections, group poster notes, and transcriptions from small group discussions served as evidence of PTs' conceptions related to issues of equity. The data analysis process began by first making notes to identify PTs' comments in the transcripts of the small group discussions and all written work. These notes served as indications of what the PTs noticed from the vignette. Then the margin notes were summarized into short phrases that emphasized the nature of the comment and were coded independently by three researchers for common themes. Any differences were resolved through refining the common themes. Finally, using Barnes and Solomon's 2013 observational categories as an initial analysis template, the common themes were clustered into the following four categories: (a) classroom management (i.e., classroom events—including disruptive events, pace changes, routines or procedures), (b) classroom environment (i.e., physical setting, equipment, demographics, grade level), (c) task selection (i.e., activities students do during the teaching episode), and (d) communication (i.e., interactions or dialogue between or among students, the classroom teacher, school personnel, or the family).

Results

Eric's case provided an opportunity for mathematics teacher educators to engage PTs in a discussion on issues related to equity, which brought an awareness to and challenged their stereotypes, hidden biases, and unproductive beliefs about students from diverse

backgrounds. The results across the three classes (see Table 1) provided an interesting perspective on what the PTs noticed in the case.

Table 1: Summary of what prospective teachers noticed from the case of Eric

BROAD CATEGORY	CLUSTERED THEMES	CODE CATEGORIES
CLASSROOM MANAGEMENT 39.9%	Positive Reinforcement 11.8%	Reward system (e.g., praise when good) Positive rewards for class Special role (e.g., leader, peer tutor)
	Negative Consequences 14.6%	Punish Eric for his behavior Remove Eric from group Hold Eric back
	Behavioral Assessment 13.5%	Document behavior Individualized Education Plan (IEP) Firm, Clear Rules Set Goals
COMMUNICATION 29.7%	Collaboration with Family 21.3%	Contact Grandmother for ideas Speak with Student 1-1
	Collaboration with School 8.4%	Contact Principal Refer to Guidance Counselor Refer to Special Education Teacher
TASK SELECTION 22.5%	Increase Rigor 12.9%	Provide Enrichment Activities Challenge Eric More
	Increase Amount of Work 9.6%	Provide “Busy Work”
CLASSROOM ENVIRONMENT 7.9%	Culturally Relevant Pedagogy 7.3%	Home learning/Background Connect with Student
	Positive Influence/Support System 0.6%	Male Role Model

While the mathematics teacher educator guided follow-up discussions to the activity that emphasized principles of equity, throughout the three classes the PTs primarily attended to classroom management with 39.9% of the referring responses pertaining to strategies such as reward systems, punishments, or behavior plans. About one-third of the classroom management responses encouraged a classroom teacher in this situation to provide students like Eric with more leadership responsibilities. Specifically, one PT expressed,

I would make Eric the classroom leader and give him jobs to do around the classroom.

Like having him turn the lights on and off and having him sharpen the pencils. This will make him feel more like he is a part of the classroom and hopefully it will make him more of a helper than someone who disrupts other student’s work.

Approximately 34% of the PTs’ classroom management responses focused on classroom behavior systems, with some students indicating that Eric was in need of a behavior intervention plan or an Individual Education Plan (IEP). In fact, one PT stated, “If he was put on an IEP for his behavior, then maybe he could get instruction in a special education setting. This way he would not be disruptive towards his peers.” Another PT expressed her belief that the behavior was such an obstacle that Eric should not continue with his peers to the next grade. She articulated, “I believe that Eric would be a great student that could really benefit from being held back this year so that he could grow and learn to practice age appropriate

behaviors.” These responses seem to imply that the student is at fault for the behavioral issues. The PTs who responded to the first reflection prompt whose solutions to the situation included behavior plans, IEPs, or retention were focused on Eric’s behavior without critically reflecting on how the teacher’s actions may be contributing to his outbursts.

While the PTs did indicate positive solutions to address Eric’s behavior, several identified classroom management strategies focused on negative consequences for Eric’s actions such as removing him from the group. One PT even noted, “Eric would be on an island far away from the rest of the class.” From these responses, it was evident the majority of PTs first noticed the behaviors, and initially directed concern to “deal with” Eric’s actions rather than attend to additional information that could provide insight to the source of these behaviors. These responses reflect a common perception or stereotype of black males as a menace to society, which can negatively impact the child and provides an obstacle for him (or her) in receiving opportunities for high quality instruction.

Communication was the second most common category that the PTs responses aligned to with 29.7% of the referring responses coded under this category. For example, in order to help subside Eric’s disruptive behavior, several PTs suggested speaking to Eric one-on-one or having Eric speak to a counselor, principal, or some other positive male role model. While collaboration with families, the school, and constructive influences in the community are integral to students’ successes, the PTs again first noticed Eric’s behavior and directed their contacts and references as resources for fixing the behaviors they found to be inappropriate for school. These actions seemed to indicate that the PTs did not feel comfortable or confident in effectively working with children who exhibit such behaviors, and also that they do not initially consider the whole child and how the classroom environment or teachers’ instructional methods may be a key factor in transforming behavior.

One of the most interesting results under the task selection category was that in each of the three courses many of the PTs focused on giving Eric more work. Some PTs across the three groups, focused on providing more challenging work, with one even emphasizing the job of the classroom teacher is to “make sure that a student is being challenged and engaged on a level that is appropriate for them.” Several of the responses (12.9% of 22.5% of the task selection responses) PTs generated seemed to support the need to select appropriately challenging tasks for Eric and indicated that a strategy to quell his behavior could be to stimulate his thinking. One PT wrote, “I would gather different math problems that challenge Eric and meet his learning needs. If need be I would have an associate take Eric out during math to work on more challenging problems to keep him engaged.” However, others suggested Eric should be given additional work to keep him busy so he would not “distract” the other students. These students’ responses (9.6% of 22.5% of the task selection responses) seemed to overlook the possibility that Eric was bored with the current assignments, and rather than exploring opportunities to stimulate his thinking through high quality tasks that appropriately challenge Eric, the PTs merely indicated the need to increase the quantity of work rather than the rigor. Decisions such as these again serve as additional obstacles in providing access to high quality mathematics instruction.

While many PTs did attend solely to Eric’s disruptive behavior, approximately 7.9% of the responses reflected an attempt to identify the source of the issue by focusing on ways they could establish a positive, caring classroom environment where students felt accepted as individuals. One PT claimed, “Students just want love and attention. This is why I think it is so important to create a caring community in the classroom. I truly believe that when students trust and feel loved and accepted they will preform much better in school.” The PTs noticed the former abuse in the fictional child’s past and his current living situation being with his grandmother. Recognizing these events can negatively impact a child and can be exhibited through defiant or inappropriate behavior. Consequently, several PTs saw the need to create a

place in which Eric could feel safe and secure. One PT articulated, “I think that the student is acting up because of his home life and I have seen this many times. Yes, you should have clear, set rules in class, but as an educator you should take the time to see where the student is coming from and maybe provide resources such as counseling.” One of the participants who commented on classroom environment recognized the need for a supportive environment and made connections to her field placement,

This similar situation happened in my practicum classroom. The boy was African American and was constantly causing problems. His home life was very busy and his single mother had him and 7 other kids with another on the way so he did not get much attention at home. I do not think that he was abused, but he definitely was disruptive in the classroom. He did not respect me and when I taught, he would do all of those things mentioned above with messing with other people’s papers and making noises during lessons...Eventually while I started to build a relationship with [him] he was really sad to see me go. It really is about making a relationship with the child and then showing them that you want to help them learn.

Although classroom environment was the least referred response in the reflection assignment, it was reassuring that some PTs did notice the need to develop a positive classroom culture by connecting with their students and providing support systems. The attention to classroom environment in the large group discussion provoked PTs’ thinking on issues related to equity. In subsequent discussions, PTs began to uncover some of their stereotypes and unproductive beliefs related to Eric’s scenario. They recognized that initially many beliefs focused on Eric and his family situation as the root of the problem, rather than noticing that behavioral issues may stem from inappropriate instructional strategies. While more efforts are needed, these discussions seem to contribute to moving PTs into the other dimensions of noticing.

Conclusion

To provide opportunities for *all* students that will challenge the status quo, we must first identify what is salient to PTs by understanding what they attend to in complex classroom situations. With this knowledge, mathematics teacher educators can more effectively address PT’s philosophies and beliefs. We understand teachers cannot attend to everything that occurs in a classroom; thus they must make choices—whether consciously or subconsciously—about what they notice. Barnes and Solomon (2013) found that novices are often attracted to whatever is most salient or personally intriguing, such as evidenced in this study with classroom management strategies to address a student’s behavior.

While classroom management is at the forefront of our PT’s thoughts, we must help them move beyond this surface layer of noticing. NCTM (2014) argues that effective mathematics instruction builds from students’ culture—their values, beliefs, language, and experiences. Therefore, the teaching and learning of mathematics is not void of cultural influence, but positioned within a social context. Noticing involves three components. From the results discussed above it is evident that PTs are attending to noteworthy instances in a classroom situation. However, mathematics teacher educators need to provide more explicit support and attention to the second and third aspects of noticing: (a) using contextual information to reason about witnessed events, and (b) making sense of the events through a contextual lens and using the knowledge to inform instructional decisions. Aligning teachers’ beliefs about equity and equitable practices in mathematics education with productive beliefs (NCTM, 2014) and research-proven attitudes and practices (Jackson, 2010) is vital. Engaging PTs in classroom activities—such as the one described with Eric’s scenario—helps foster reflective discussions, which can positively contribute to developing an equity-centered orientation toward mathematics teaching and learning.

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